A focus on the regulation of carotenoid accumulation in carrot root.

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Auteur	Perrin, Florent [1], Geoffriau, Emmanuel [2], Peltier, Didier [3], Gagné, Séverine [4]
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Mots-clés	Carotenogenesis [5], Daucus carota [6], Pigments [7], Product quality [8], regulation scales [9]
Résumé en anglais	Carotenoids are important plant metabolites considered as beneficial for human health. Provided by fruits and vegetables, they are supposed to be implicated in preventing several chronic diseases. In plants, carotenoids play multiple roles as antioxidant molecules. In light-exposed organs, they also act as photosynthesis accessory pigments and pollinator or disseminator attractors. However, in underground organs, like tuber or root, their role is not clearly understood. Carrot is one of the most important sources of dietary carotenoids due to high content in root. Moreover, the large genetic diversity of this species makes it a suitable model to study carotenogenesis. This diversity results in a differential accumulation of carotenoids: mostly β-carotene, α-carotene, lycopene and lutein, leading to various root colors. Although the carotenoid biosynthetic pathway is well-characterized, basic knowledge of carotenogenesis regulation in roots is still lacking. It is generally considered that carotenoid biosynthesis may be controlled at distinct levels: allelic polymorphism, transcriptional regulation, chromoplast differentiation and root development. Previous works have been conducted to elucidate how those different regulation scales impact carotenoid accumulation in carrots. For instance, single nucleotide polymorphisms detected in carotenoid biosynthesis genes like PSY are correlated with root color. However, little is known about the other types of regulation in carrot. In relation with these intracellular mechanisms, external factors may affect carotenoid accumulation as demonstrated for other plant secondary metabolites. This presentation is an overview of the current knowledge about the regulation of carotenoid accumulation in carrot root and the remaining questions to be addressed.
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